Work Plan to Evaluate Ozone Damage in the Dolly Sods and Otter Creek Wilderness, Monongahela National Forest

By

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The Dolly Sods and Otter Creek Wildernesses have been designated as Class I air quality areas under the Clean Air Act of 1977. Class I air quality limits the additional increment of air pollution allowed within the two wildernesses. Therefore, new major pollution emission sources are not to increase air pollution levels such that resource values are impacted.

Air pollution is suspected of causing injury to plants throughout the Eastern United States. Ozone is considered to be the primary air pollutant involved and can be monitored by examining ozone sensitive plants. Previous evaluations conducted in 1988 through 1990 have documented ozone symptoms on nine species at Dolly Sods and/or Otter Creek Wilderness.

Objectives

The objectives of this study are to:

1) Evaluate the incidence and intensity of ozone symptoms within the two wildernesses.

2) Describe what percentage of the leaves (intensity) on black cherry, white ash and tulip poplar have ozone symptoms, and what is the average severity of the ozone symptoms.

Methods

Wilderness Surveys. Table 1 lists which plots within, or adjacent, to the wildernesses which will be used in future surveys. Examination of as as many plots as time will permit will be made at Otter Creek during the weeks of July 15 and July 29. All of the plots at both wildernesses will be visited the weeks of August 19 and 26. The approximate location of the plots are found on topographic maps (Barry Edgerton should have a duplicate copy), and the plot description sheets (in the 1988 data folder) should assist in relocating the plots.

Table 1. Plots and species to be examined at the Wildernesses.

Black Cherry	Milkweed	White Ash	Tulip Poplar	Elderberry	Viburnum sp.
Dolly Sods					
10	1				7 ✓
15 ✓	2				18 ✓
17 ✓	3				19
19 ✓	4				20
21 ✓	9				25
22 ✓	13 ✓				26
26 ✓	14 ✓				
28 ✓	15				
	16 ✓				
Otter Creek					
6	8	13	[3] a	7	11
[10]	9	20	[5]	15	
34	13		12	[18]	
35	14		13	[19]	
[36] 37	17		[20]	[24]	
38			[21]	25	
41				26	
43				31	

a, Skin Eldest vegetation removed

The observations to be recorded on each of the 15 bioindicators present at the plots are:

1. The percentage of foliage with any ozone symptoms (intensity) using a five percent scale (0, 1-5, 6-10, etc., 96-100) where the upper end of the range is recorded on the data form. Also, the Horsfall - Barratt scale will be used and the appropriate category listed in Table 2 will be recorded.

Table 2. Ranges of ozone symptoms using the Horsfall - Barratt scale.

Category	Range	Category	Range	Category	Range
0	0	4	25 to 12	8	88 to 94
1	3 to 0	5	50 to 25	9	94 to 97
2	6 to 3	6	50 to 75	10	97 to 100
3	12 to 6	7	75 to 88	11	100

2. Estimate the average percentage of ozone symptoms (severity) for all the leaves using the Horsfall - Barratt scale (Table 3), and according to the following severity classification:

0 = absent
1 = trace (1 - 5 percent of the leaf with symptoms)
2 = light (6 - 25 percent of the leaf with symptoms)
3 = moderate (26 - 50 percent of the leaf with symptoms)
4 = heavy (greater than 50 percent of the leaf with symptoms)

Notes on any other species (aster, blackberry, honey locust, Northern fox grape, trembling aspen, witch-hazel, red maple, or others), and their location, which have symptoms of ozone damage should be recorded. These plants can be located at the plots, along the roads adjacent to the wildernesses, or along the trail systems between the plots.

Samples of plant materials (one branch or herbaceous plant) will be taken only the weeks of August 19 or 26. Samples will be collected and placed in a plant press for the following conditions:

1. The first individual of a species in the plot that is recorded to have ozone damage.

2. Species of plants that are not known to the field crew to be sensitive to ozone, but show ozone symptoms.

3. Individuals in a plot in which the field crew members are not confident the damage is ozone related.

Care should be taken so sample collecting is not obvious to other users of the wilderness, and injury does not occur to woody species. Samples will be examined by the Morgantown FPM staff for other possible insect and disease agents.

both future ad in addition to the wilderness trail surveys.

Permanent plots. Tenth acre (radius = 37.2 feet) permanent plots will be established where 50 black cherry, tulip poplar and/or white ash can be found. The plots will be located in areas which have been regenerated in the past 5 to 20 years, and the stand is larger than 2 acres in size. The location of the plots will be on Shavers Mountain and the Fernow Experimental Forest. Both of these areas are adjacent to Otter Creek Wilderness.

Each tree will be rated for ozone symptoms using the Horsfall - Barratt scale (Table 2) for the incidence and average severity of the damage. The measurements will be taken the weeks of July 15 and 19, and August 19. Also, recorded for each tree will be the diameter at 4.5 feet, the relative density of the crown (using 5% classes), notes on any problems with the tree, and the azimuth and distance from the center stake.

The center stake will be marked with orange paint, and each tree in the plot will be number (yellow) or marked with a small amount of blue paint.

Safety. Each field crew member should carefully study the safety manual written for the Red Spruce Decline project. Extra care needs to be taken at Dolly Sods because there may be undetonated bombs in the wilderness.

Wilderness: **Plot Number:** **Crew:**
Species: **Date:**

Number	Percent Foliage [a]	Severity[b]		Percent Foliage[c]	Severity[c]	Notes
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

Wilderness: **Plot Number:** **Crew:**
Species: **Date:**

Number	Percent Foliage [a]	Severity[b]		Percent Foliage[c]	Severity[c]	Notes
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

[a] Enter the number for the upper end of the 5% scale (0, 1-5, 6-10, etc. 96-100)

[b] Severity classifictation: 0 = absent, 1 = trace, 2 = light , 3 = moderate , and 4 = heavy

[c] Enter the category number for the Horsall - Barratt scale: **0** = 0, **1** = 3 to 0, **2** = 6 to 3, **3** = 12 to 6, **4** = 25 to 12 **5** = 50 to 25, **6** = 50 to 75, **7** = 75 to 88, **8** = 88 to 94, **9** = 94 to 97, **10** = 97 to 100, **11** = 100

Wilderness: **Plot Number:** **Crew:**
Species: **Date:**

Number	Bearing	Azimuth	Diameter	Percent Foliage[a]	Severity[a]	Relative Density[b]	Notes
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
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45							
46							
47							
48							
49							
50							

[a] Enter the category number for the Horsall - Barratt scale: **0** = 0, **1** = 3 to 0, **2** = 6 to 3, **3** = 12 to 6, **4** = 25 to 12 **5** = 50 to 25, **6** = 50 to 75, **7** = 75 to 88, **8** = 88 to 94, **9** = 94 to 97, **10** = 97 to 100, **11** = 100

[b] Enter the number for the upper end of the 5% scale (0, 1-5, 6-10, etc. 96-100)